

### **REMARKS/ARGUMENTS**

In the Office Action dated March 22, 2007, **Claims 34-37** were objected to and **Claims 19-26** and **30-37** were rejected. The March 22 Office Action has been carefully considered. After such consideration, **Claims 19-26** and **30-35** are amended, and **Claim 37** is canceled in this application to overcome the objection and rejections of the Examiner. **Claims 19-26 and 30-36** remain pending, in this application. Applicants respectfully request reconsideration of the application by the Examiner in light of the following remarks offered in response to the March 22 Office Action.

#### **Objection to the Claims**

The Examiner has objected to Claims 34-37, as the sentences “a portion of said wall immediately adjacent to fuel cell and said sealed passage are configured...” and “a portion of said wall immediately adjacent to said fuel cell and said sealed passage are made...” are grammatically incorrect. Claims 34-37 have been modified and the Applicants respectfully submit that the modified claims are in condition for allowance.

#### **Rejections under 35 U. S. C § 112**

Claims 19-26 and 31-37 have been rejected under 35 U.S.C 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regards as the invention. The Examiner raised the question that it is unclear whether the phrase “said wall” is referring to the top wall, bottom wall, or both top and bottom walls. Applicants respectfully submitted the amended claims 19-26 and 31-37, which is amended in corporate changes suggested by the Examiner.

The independent claim 19, dependent claims 26, and 31-36 have been amended. The dependent claim 37 has been canceled. Claims 19-26 and 31-36 clearly define the phrase “said wall” and distinctly claim the subject matter which applicant regards as the invention. Therefore, the Applicants request the Examiner to withdraw the 112 rejections to claim 19-26 and 31-37.

#### **Improper Final Rejection**

The Examiner indicated that the current Office Action has been made final. Applicants submit that although the Office Action has been made final, the Examiner’s rejections have changed. Applicants respectfully submit that, in the previous Office Action, claims 19-26 and 30-37 were rejected

under 35 U.S.C. § 103(a) as being unpatentable over Isobe in view of Hartvigsen. As per MPEP section 706.07 (a) any new reference cited by the Examiner makes the Final Rejection Improper if the reference is not mentioned in IDS. The Applicants humbly submit that Barnett was neither cited by the Examiner before nor was mentioned in IDS submitted by the Applicants. Therefore the Applicants request the Examiner to kindly withdraw the finality of the Office Action.

**Rejections under 35 U. S. C 103 (a)**

Claims 19-26 and 30-37 are rejected under U.S.C. 103 (a) as being unpatentable over Barnett *et al*, US5770327 (hereinafter Barnett) in view of Hartvigsen *et al*, US6265095 (hereinafter Hartvigsen). Applicants respectfully traverse the rejection.

Applicants respectfully assert that the present invention, as recited in independent claim 19 is patentable over the Barnett reference. Independent claim 19 recites *the fuel cell stack comprising electrically coupled fuel cell assemblies having at least one sealed passage, whereas each fuel cell assembly describes a unique hollow manifold comprising a top and bottom wall, extending between a first end and a second end. The top wall comprises at least one opening extending through in flow communication with the hollow manifold. A portion of the top wall or the bottom wall, immediately adjacent to the fuel cell and the sealed passage are configured to have a compliant structure to accommodate a strain arising during the thermal cycle of the fuel cell assembly. Therefore, the compliant structures provided are immediately adjacent to the fuel cell and adjacent to the sealed passages to accommodate the stress during the thermal cycles. Secondly, in the present application, the compliant structures immediately adjacent to the fuel cell and sealed passages are part of the top wall or the bottom wall, which defines the hollow manifold.*

The Examiner's entire rejection is based on the need for Barnett, and Hartvigsen to teach, alone or in combination, the fuel cell stack comprising electrically coupled fuel cell assemblies having at least one sealed passage, whereas each fuel cell assembly describes a unique hollow manifold comprising a top and bottom wall, extending between a first end and a second end. The top wall comprises at least one opening extending through in flow communication with the hollow manifold. A portion of the top wall or the bottom wall, immediately adjacent to the fuel cell and the sealed passage are configured to have a compliant structure to accommodate a strain arising during the thermal cycle of the fuel cell assembly.

The Examiner stated that:

Barnett discloses a solid oxide fuel cell stack comprising a plurality of unit fuel cells "13" and a plurality of interconnects "12" that form a plurality of fuel cell assemblies that are electrically connected together such that at least one sealed passage "26" extends between the plurality of fuel cell assemblies, wherein each fuel cell assembly comprises: a hollow manifold comprising an upper sheet "16" and lower sheet "18" that extends between a

first end and a second end and comprises openings “29”, “31”, “32” extending there through in flow communication with the hollow manifold; and a fuel cell comprising an anode “36”, a cathode “38”, and an electrolyte “37” disposed there between with the fuel cell disposed on the lower sheet “18” (See column 2, lines 21-55 and Figures 3 and 4). It also discloses a cathode flow channel “22” coupled to the hollow manifold of first fuel cell assembly and second fuel cell assembly, wherein the cathode flow channel is configured for directing an oxidant between the first fuel cell assembly and the second fuel cell assembly (see column 2, lines 59-63 and Figure 5). It also discloses a hollow manifold for the first fuel cell assembly and the second fuel cell assembly that is substantially rectangular (see column 3, line 13 and Figure 4). It also discloses interconnects “12” that consists of metal sheets which are electrically conductive materials (See column 2, lines 23-25). It also discloses a fuel cell stack that comprises materials of different thermal coefficients of expansion such as ceramic electrodes of the fuel cell and metallic interconnects. It also discloses a lower sheet “18” of the hollow manifold that acts as an anode interconnect (See Figure 4).

The Examiner acknowledged that Barnett fails to teach a portion of the top wall and bottom wall immediately adjacent to the fuel cell and the sealed passage that are configured to have lower stiffness compared to at least one of the fuel cell and the sealed passage to accommodate a strain between the fuel cell, top and bottom walls and the sealed passage wherein the strain is developed due to thermal expansion. However, the Examiner relied on Hartvigsen to provide *a portion of the top wall and bottom wall immediately adjacent to the fuel cell and the sealed passage that are configured to have lower stiffness compared to at least one of the fuel cell and the sealed passage to accommodate a strain between the fuel cell, top and bottom walls and the sealed passage wherein the strain is developed due to thermal expansion.*

The Examiner stated that

it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Barnett fuel cell stack to include a portion of the top wall and bottom wall immediately adjacent to the fuel cell and the sealed passage that are configured to have lower stiffness compared to at least one of the fuel cell and the sealed passage to accommodate a strain between the fuel cell, top and bottom walls, and the sealed passage wherein the strain is developed due to thermal expansion;

The Examiner further stated that

It is inherent that the first and second compliant sheets have lower stiffness compared to the fuel cell. Since the entire compliant sheet “70” is corrugated as shown in figures 2 and 3, a corrugated portion will always be immediately adjacent to the fuel cell and sealed passage.

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte*

*Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). *See*, MPEP 2143.

Applicants respectfully submit that the above combination is inconsistent with the cited case law. In particular, Barnett itself would provide a solution to the motivation suggested by the Examiner. Hence, the combination would lack any motivation in the art, at least for the reasons proposed by the Examiner. The solid oxide fuel cell stack of Barnett comprises a plurality of metallic interconnects each having parallel elongated internal cavities, a plurality of fuel cells and various manifolds. Thus the solid oxide fuel cell stack of Barnett includes the metal interconnects which are easily fabricated without machining, reducing fabrication costs. *See*, Barnett et al., column 3, lines 47-49. Further, Barnett suggests that the gas flow cavities within the interconnect pieces can be used for heat exchange. *See*, Barnett, column 4, lines 7-9.

Thus, Applicants respectfully submit that Barnett provides the solid oxide fuel cell stack comprising, metallic interconnects, rectangular fuel cells and few manifolds, where metallic interconnects each having three parallel elongated internal cavities, with the center elongated cavity having a plurality of holes extending to one major surface of the interconnect and the outer cavities each having a plurality of holes extending to the other major surface of the interconnects. *There is no need to directly acquire the compliant structures immediately adjacent to the fuel cell and the sealed passages to accommodate a strain between the fuel cell, top and bottom walls, and the sealed passage wherein the strain is developed due to thermal expansion.* Additionally, there is no need to have a portion of the wall immediately adjacent to the fuel cell and the sealed passages to have corrugated structure to accommodate a difference in strain between the fuel cell, the wall and the sealed passage. .

As regards, specifically, to claim 19 of the present application, Applicants also assert that the

fuel cell stack describes a unique hollow manifold comprising a top and bottom walls, extending between a first end and a second end. The top wall comprises at least one opening extending through in flow communication with the hollow manifold. A portion of the top wall or the bottom wall, adjacent to the fuel cell and the sealed passage are configured to have a compliant structure to accommodate a strain arising during the thermal cycle of the fuel cell assembly. Therefore, the compliant structures provided are immediately adjacent to the fuel cell and adjacent to the sealed passages to accommodate the stress during the thermal cycles, and the compliant structures immediately adjacent to the fuel cell and sealed passages are part of the top wall or the bottom wall, which defines the hollow manifold.

The interconnects (12) in Barnett that consists of metal sheets (16), (17), and (18) having three parallel elongated internal cavities, with the center elongated cavity having a plurality of holes extending to one major surface of the interconnect and the outer cavities each having a plurality of holes extending to the other major surface of the interconnects. The gas flow cavities within the interconnect pieces is used for heat exchange to avoid any strain within the system.

Similarly, Hartvigsen does not disclose, teach or suggest a fuel cell stack system at all. In fact, Hartvigsen teaches that one skilled in the art may not need an additional modality and may just rely on the compliant sheet of materials associated with one of the cathode side and the anode side of the separator, wherein the compliant material provides mechanical and electrical contact between the separator plate and the respective anode or cathode. In short, Hartvigsen abandons the need of an interconnects (12) that consists of metal sheets (16), (17), and (18) having three parallel elongated internal cavities, with the center elongated cavity having a plurality of holes extending to one major surface of the interconnect and the outer cavities each having a plurality of holes extending to the other major surface of the interconnects. As such, Hartvigsen never addresses the problem of the fuel cell stack having compliant structures immediately adjacent to the fuel cell and sealed passages are part of the top wall or the bottom wall, which defines the hollow manifold.

Further, Hartvigsen fails to obviate deficiencies in the teachings of Barnett. The mere fact that Hartvigsen discusses a compliant sheet of materials associated with one of the cathode side and the anode side of the separator, wherein the compliant material provides mechanical and electrical contact between the separator plate and the respective anode or cathode is not sufficient to addresses the problem of the fuel cell stack having compliant structures immediately adjacent to the fuel cell and sealed passages are part of the top wall or the bottom wall, which defines the hollow manifold as recited in claim 19. In short, neither reference teaches or suggests such a fuel cell stack having a unique hollow manifold comprising a top and bottom walls, extending between a first end and a second end, wherein

the top wall comprises at least one opening extending through in flow communication with the hollow manifold, and a portion of the top wall or the bottom wall, adjacent to the fuel cell and the sealed passage are configured to have a compliant structure to accommodate a strain arising during the thermal cycle of the fuel cell assembly. Moreover, there is no basis for entirely altering the nature and operation of the fuel cell stack disclosed in Barnett reference so as to enable a portion of the top wall or the bottom wall, adjacent to the fuel cell and the sealed passage are configured to have a compliant structure to accommodate a strain arising during the thermal cycle of the fuel cell assembly.

**The Examiner's purported motivation to combine the references is unfounded.**

The Examiner stated:

“It is inherent that the first and second compliant sheets have lower stiffness compared to the fuel cell. Since the entire compliant sheet “70” is corrugated as shown in figures 2 and 3, a corrugated portion will always be immediately adjacent to the fuel cell and sealed passage.”

Even if this were true, it does not establish that either reference teaches or even suggests the claimed invention. Thus, Applicants respectfully submit that a person skilled in the art would not be prompted to combine Barnett and Hartvigsen with each other or with other references to provide the result suggested by the Examiner. To the extent that Barnett and Hartvigsen already provide a solution to the same problem and therefore abandon the need of any other solution or advantage cited by the Examiner as motivating the combination.

When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). Applicant respectfully submits that neither of the Barnett, and Hartvigsen references suggests the combination relied upon by the Examiner or a motivation for such a combination and therefore cannot be fairly combined as suggested by the Examiner. Accordingly, Applicants believe that the combination is not obvious to one skilled in the art and the Examiner is impermissibly using hindsight reconstruction to pick and choose among isolated disclosures in the prior

art to deprecate the claimed invention.

MPEP 2143.01 III. states that,

[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.

Mere fact that the Barnett reference *can be* modified is not sufficient to establish a *prima facie* case of obviousness.

Applicants respectfully submit that, as stated above, there is no suggestion or motivation to modify the teaching of Barnett and Hartgvisen. Accordingly, the mere fact that the Barnett reference can be modified is not sufficient to establish a *prima facie* case of obviousness.

In view of the forgoing considerations, Applicants submit that the references fail to establish a *prima facie* case of obviousness of claim 19. Claims 20-26, and 30-36 depend directly from claim 19. Accordingly, Applicants submit that claims 20-26, and 30-16 are allowable by virtue of their dependency from an allowable base claim. Applicants also submit that the dependent claims are further allowable by virtue of the subject matter they separately recite. Thus, it is respectfully requested that the rejection of claims 19-26, and 30-16 under 35 U.S.C. §103(a) be withdrawn.

**Summary**

In view of the remarks and amendments set forth above, Applicants respectfully request that a timely Notice of Allowance be issued in this case.

If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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